

SUSTAINABLE USE OF BY-PRODUCTS FROM COLD-PRESSING OF HAZELNUT OIL: FUNCTIONAL BAR WITHOUT ADDED SUGARS

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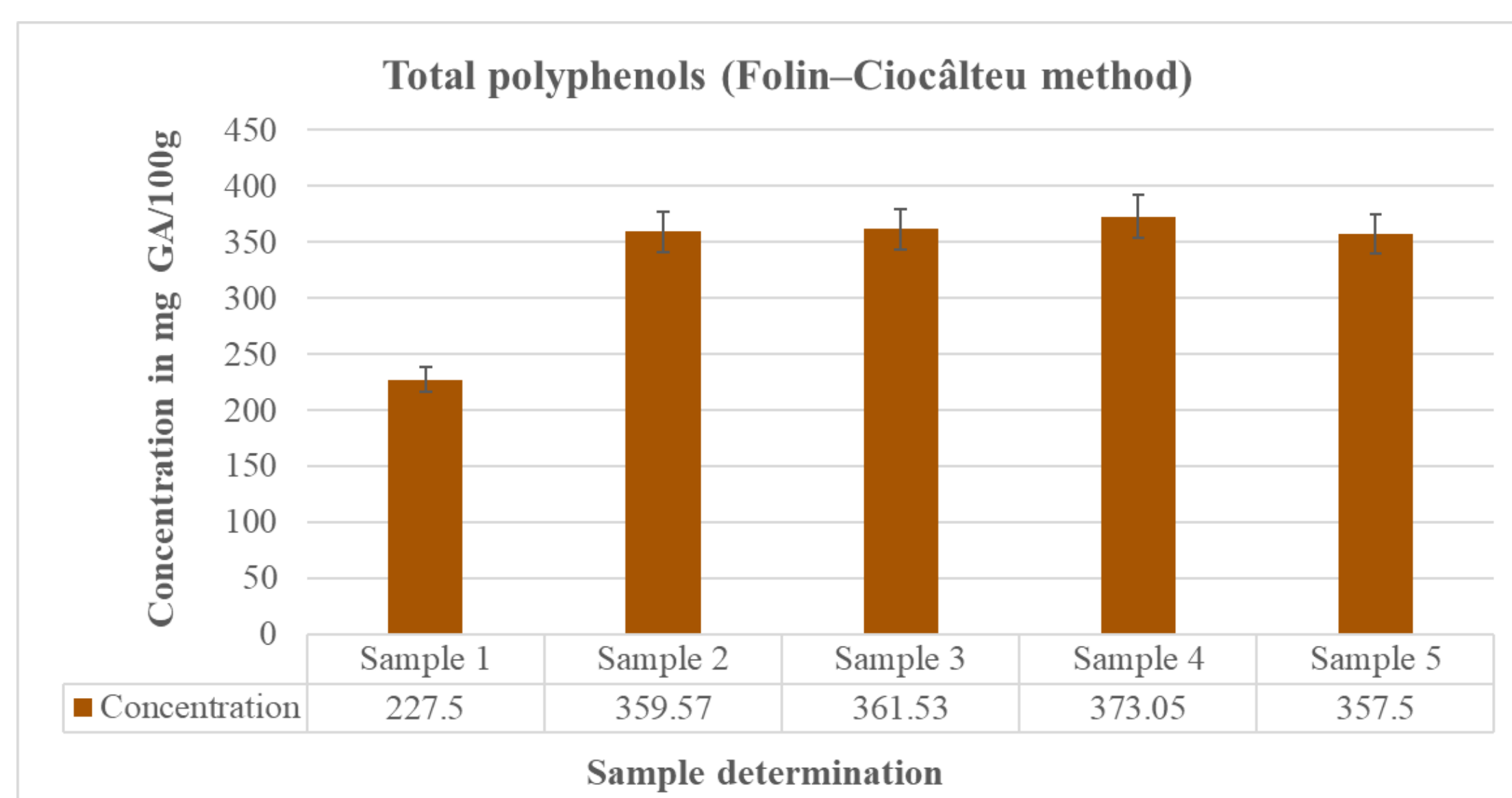
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Introduction

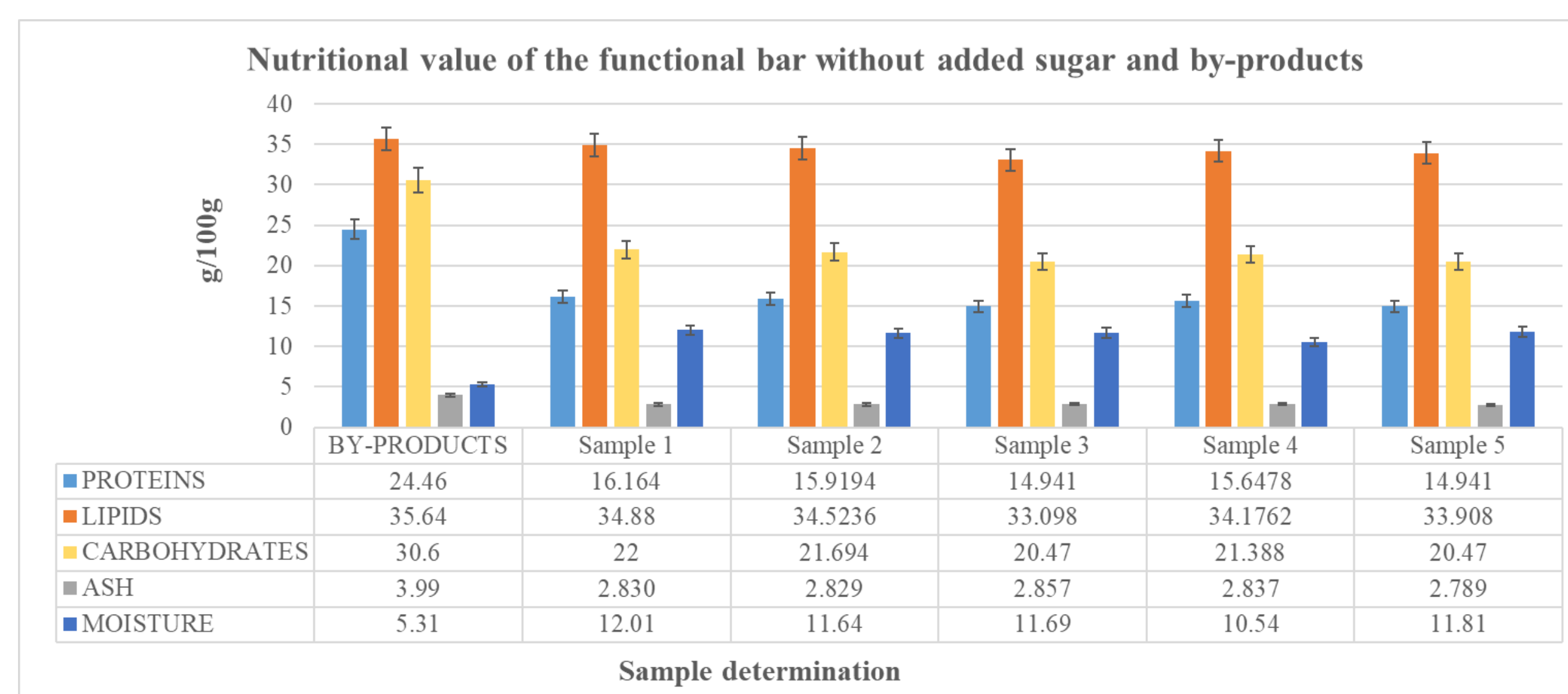
Hazelnuts are some of the most popular oilseeds in the world, consumed raw or roasted. As global hazelnut production increases, the amount of secondary products also grows, leading to significant waste and environmental stress. Hazelnuts and their by-products are rich in bioactive compounds with antioxidant, antibacterial, and prebiotic effects. The study focuses on transforming hazelnut by-products, particularly the cold-pressed hazelnut cake—a residue left after oil extraction—into a functional, organic, and sugar-free snack bar. Since processing 1 kg of hazelnuts yields about 400 g of oil and 600 g of nutrient-rich by-products, these residues present a sustainable opportunity for reuse. The hazelnut cake, high in proteins, lipids, fibers, and polyphenols, was processed into flour and combined with other fiber- and antioxidant-rich ingredients to create five bar formulations. Each variant underwent proximate composition analysis (proteins, lipids, ash, moisture), as well as tests for total and individual polyphenols and antioxidant activity to identify the optimal formulation. The study highlights the potential of hazelnut by-products as valuable ingredients for sustainable, health-oriented food products.

Material and methods

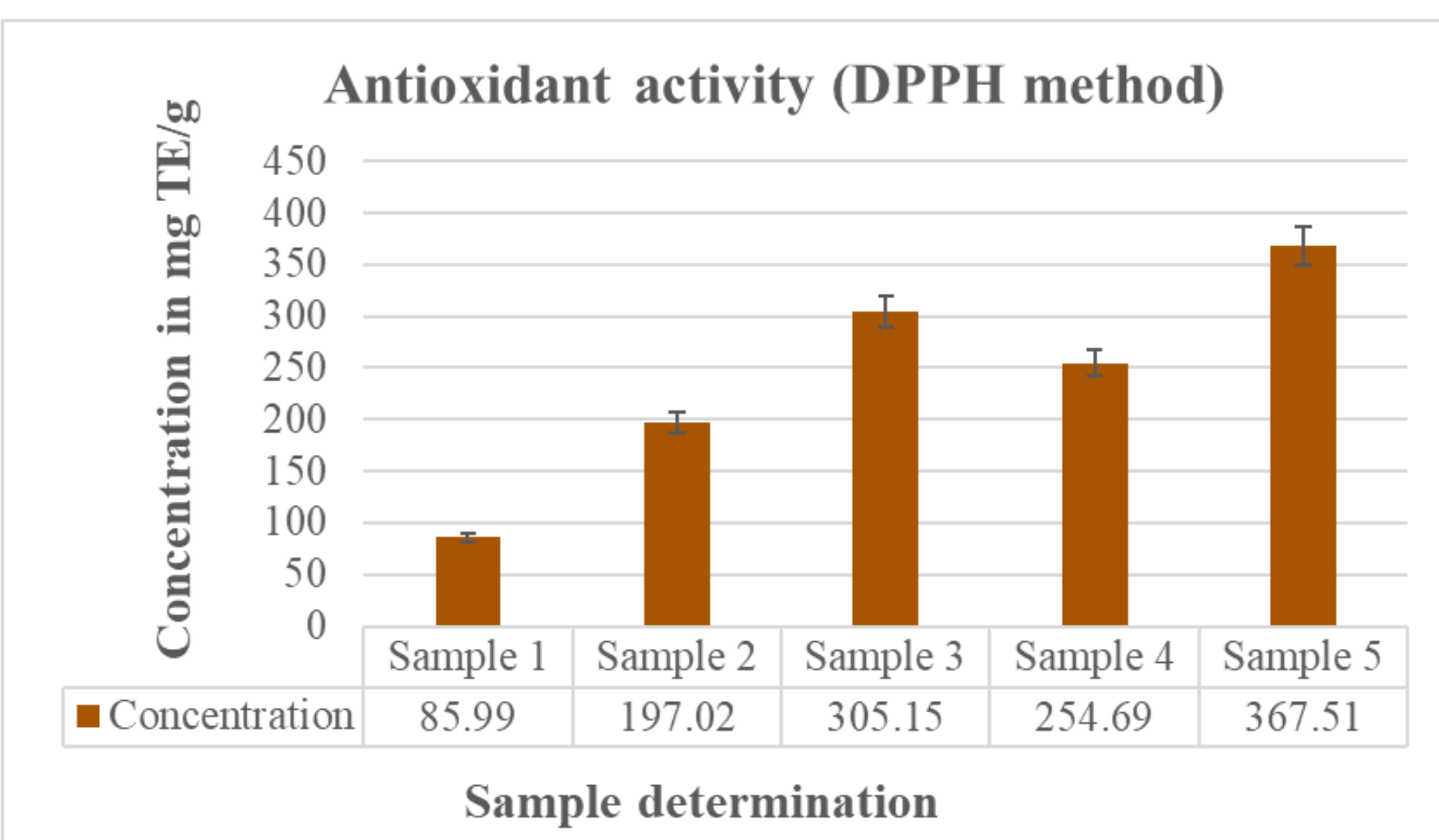
- Proximate analysis (proteins, lipids, ash, and moisture)
- Total polyphenols (Folin–Ciocâlteu method)
- Individual polyphenols (high-performance liquid chromatography – HPLC)
- Antioxidant activity (DPPH method)



Results and discussions



Peak Nr.	R _t (min)	Antocyanin	Sample 2 (mg/100g)	Sample 3 (mg/100g)	Sample 4 (mg/100g)	Sample 5 (mg/100g)
1	10.21	Dephinidin-glucoside	5.194	8.626	4.729	8.807
2	11.01	Cyanidin-glucoside	6.407	9.375	6.097	10.485
3	11.71	Petunidin-glucoside	7.517	21.223	8.601	17.893
4	12.66	Peonidin-glucoside	9.220	27.908	11.053	29.224
5	14.09	Malvidin-glucoside	8.446	15.596	8.033	14.537
6	15.48	Malvidin	7.852	10.098	6.020	10.795
Total antocyanins			44.635	92.825	44.532	91.741



Conclusions

- Our study starts from a real need of an economic partner
- The by-product was valorized by implementing it into a product intended for a specific category of consumers - diabetics, among others.

- Sustainable
- Bio
- No added sugars
- Source of plant proteins
- No added sugars
- Source of antioxidants
- Rich in fibers
- Suitable for functional and clean label diets

References: [1] Helstad *et al.*, *Journal of Food Science* 87 (2022) 312.

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